

1

Introduction to the Study of Cell and Molecular Biology

CASE STUDY: Why don't antibiotics cure my cold?

Picture the scene: it's winter, your head aches, your sinuses are clogged, your coughing and sneezing won't stop. Do you go to the Dr. and can the Dr. help you? The common cold plagues so many people every winter, and people just want to be cured. One often hears about people going to the Dr. and asking for antibiotics for their cold, but they will not help. Why?

Colds are caused by a group of viruses known as the rhinovirus family. Viruses are microorganisms that can infect the cells of our body. They are nasty because they are essentially parasites that co-opt our cellular machinery to reproduce themselves. In contrast, bacteria do not cause colds but rather can be the cause of a secondary infection that occurs during or after a cold. Many bacteria normally live in our bodies, but sometimes these bacteria begin to multiply and accumulate causing infection. In addition, our bodies can be infected by bacteria that are contracted from other people or objects and cause infection.

Questions:

1. Penicillin is an antibiotic that acts by inhibiting the formation of peptidoglycan cross-links in the bacterial cell wall. Based on your knowledge of the structure of bacteria and viruses, will penicillin effectively kill the rhinovirus? Why or why not?
2. People also talk about catching a cold by touching surfaces that have been touched by someone else with a cold, such as the faucet handle of a bathroom sink. Can the cold viruses that are on these surfaces be replicating and reproducing? Why or why not?
3. After entering cells, most viruses will use the host cell RNA polymerase to transcribe their DNA into RNA, which will get translated into proteins that are needed for virus function. There has been a lot of interest over the past couple of years regarding the use of anti-viral drugs that act to halt the viral replication cycle. Scientists are continually trying to develop new drugs that

target different aspects of the viral life cycle. Do you think it would effective to target a drug to cellular RNA polymerase to halt viral replication? Why or Why not?

Where can I learn more?

1. Proud, D., Upper airway viral infections. Pulmonary pharmacology & therapeutics, 2008. 21: p. 468-473.
2. Peters, N.K., D.M. Dixon, S.M. Holland and A.S. Fauci, The research agenda of the National Institute of Allergy and Infectious Diseases for antimicrobial resistance. The Journal of infectious diseases, 2008. 197: p. 1087-1093.
3. Palmenberg, A., D. Spiro, R. Kuzmickas, S. Wang, A. Djikeng, J.A. Rathe, C. M. Fraser-Liggett, and S. B. Liggett. Sequencing and analyses of all known human rhinovirus genomes reveals structure and evolution, Science, 2009. Published online February 12 2009; 10.1126/science.1165557